

Montana Weather/Precipitation Summary

February 2017 NOAA's National Weather Service Great Falls Montana

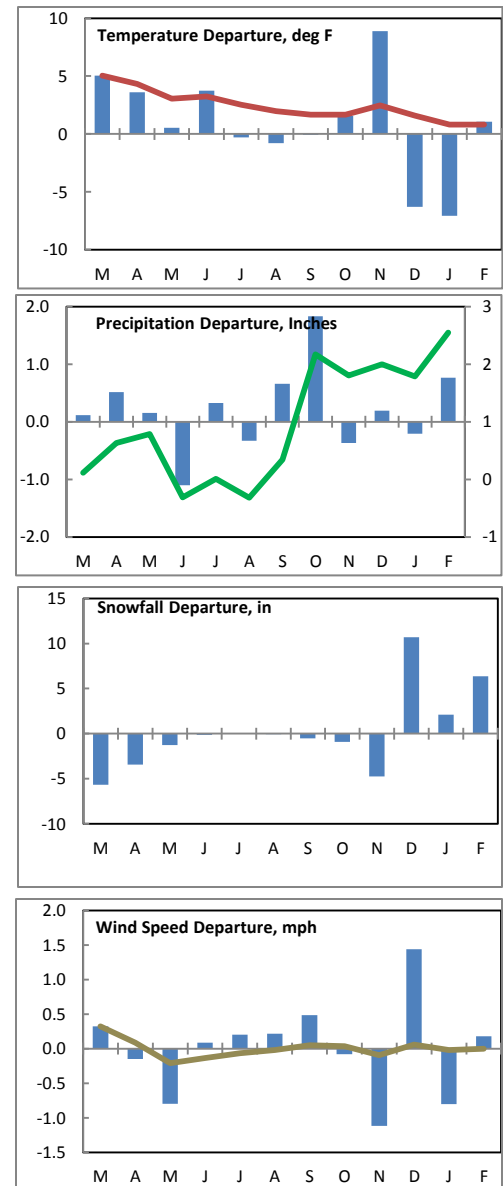
Although a weak ridge dominated the western North American coast in February, it was much weaker than normal (Fig. 1). This brought general westerly flow to the state, which contributed to much above normal precipitation, especially across the west (Fig. 3). And even though temperatures were well above normal for almost two weeks, the averages for the month were above normal east and below normal west (Fig. 2). Wind averages were near to above normal.

After a cold December and January, temperatures rebounded in February. Although temperatures averaged below normal in western Montana, the statewide composite average was a little above normal. The red line on the graph to the right shows the cumulative 12-month departure from normal. The temperature anomalies ranged around five degrees below normal in northwest Montana to four degrees above normal at Ekalaka (Fig. 2). The warmest average monthly temperature was 32.8°F at Fourmile RAWS (Park) and the coolest was 17.9°F at Point Six (Missoula). This was the 45th warmest February of record. For the past 12-months, the statewide composite average temperature is 0.8°F above normal. Six of the last 12 months have had warmer than normal temperatures.

The monthly departure from normal for precipitation across Montana is shown in Figure 3. The wettest areas were across western Montana. The highest precipitation amount recorded was 14.20-inches at Hoodoo Basin (Mineral). Elsewhere, 9.60" was reported at Many Glacier and 7.63" at 28SSW of Libby. New monthly records for precipitation were set at several locations from East Glacier and Many Glacier westward through northwest Montana. Kalispell recorded their second wettest February of record. Statewide, this month averaged 1.34", or 0.76" above normal. This was the 4th wettest of record and the wettest since 1986. The statewide composite precipitation for the past 12 months is 2.55" above normal. The green line on the graph to the right shows the cumulative 12-month departure from normal. Eight of the past 12 months have measured above normal precipitation.

Snow amounts were variable, however the average snowfall was above normal. The statewide average was 6.4-inches above normal, the 10th snowiest of record and snowiest since 2014. East Glacier reported the largest amount (68.5"), followed by St Mary (67.5"). Note how every month of the past 12 has had below normal snowfall, except December, January and February.

The statewide average winds were stronger than normal over most of the state. Statewide, the month ranked as the 32nd calmest February of record. The statewide composite average was 8.9 mph, 0.2-mph above normal. The brown line of the wind graph to the right shows the 12-month cumulative statewide wind departure from normal. The 12-month average is running near normal. Seven of the past 12 months have had above normal average speeds. The fastest average speed was 18.7 mph at Norris Hill (Madison). At lower elevations, the strongest average was 17.9 mph at Livingston. The strongest wind gust was 96 mph at Deep Creek RAWS on the 10th.



Refer to NEIC's State of the Climate report for the latest monthly discussion:

<http://www.ncdc.noaa.gov/sotc/>

Feb 1-8

The first week of February continued a cold pattern that started at the end of January. Temperatures returned to below zero values after a weather system brought heavy snow to southern Montana on the first. Up to 21" of snow was reported near Livingston, with 14" at Red Lodge and Nye, and 10" at Church Hill and Big Sky. A slight warm-up on the 3rd and 4th was accompanied by widespread freezing rain across western Montana. Meanwhile, heavy snow started falling over northwestern Montana. By the morning of the 7th, over five feet of snow had fallen at East Glacier and St Mary. Fifty-two inches was reported at Marias Pass and 46" at Polebridge. Water-equivalent of the snow ranged from four to five inches. See section on this storm later.

A rapid warm-up was expected on the 8th. This also brought on another round of snow across southern Montana. Livingston and Fishtail both reported about 8". The warm-up did occur. Great Falls saw temperature rises of 52° on the 9th. Similar rises were seen over much of central Montana. Some spots also saw rapid short-term rises, as much as 20-30° in an hour.

Feb 9-22

A two-week period of above normal temperatures, windy and mostly dry conditions prevailed after the 9th. Precipitation on the 9th fell over western Montana, with a small area of freezing rain over eastern portions. Precipitation amounts up to 2-inches produced flooding in some portions of western Montana. I-90 was closed for a period when water from rain and snowmelt covered the road near St Regis. Although western Montana experienced rain, snow and freezing rain on the 9th, warmer conditions spread across the state.

Winds began to blow along the eastern slopes of the Rockies. Gusts reached 77 mph west of Choteau, 68 mph at Livingston and 77 mph at Two Medicine. Winds continued on the 11th with gusts to 71 mph at Sapphire Village and 64 mph south of Malta. Some flooding occurred along the Musselshell River near Roundup.

Temperatures soared to record values at Lewistown on the 14th, reaching 59°. On the 15th, records again fell at Great Falls, Havre, and Lewistown. Dry Blood Creek and Fort Belknap both reached 73°F. This established a new statewide daily record. The old record was 69° at Gibson Dam. Winds were on the gusty side on the 16th. Gusts reached 64 mph at Livingston. Thunderstorms broke out over central Montana, with lightning observed over Lewis and Clark County. A new daily state high temperature was established at Dry Blood Creek. They reached 71°F.

Windy conditions continued on the 17th. Gusts reached 79 mph at Deep Creek RAWS and 66 mph west of Choteau. By the 19th, temperatures had cooled somewhat. A weather system brought six-inches of snow to the Centennial Mountains in southwest Montana. Windy conditions across southwest Montana caused gusts of 78 mph at Lone Mountain (Big Sky) and 60 mph at Norris MDT on the 20th.

A cold front sweeping across the state set off some thunderstorms once again. Lightning was observed in northern Meagher County on the 21st. Thunderstorm gusts reached 60 mph at Baker, while general windiness produced gusts to 64 at Elkhorn Mountain. Behind the cold front, up to six-inches of snow fell over the Bears Paw Mountains on the 22nd.

Feb 24-31

The last week of the month was cooler and wetter. Snow over southern Montana on the 24th dumped 15" at Fishtail and 10" at Red Lodge. Another weather system produced snow across much of the state on the 26th. Amounts up to 20-inches fell in the Bridger Mountains, 8" in the Little Belts and nearly 7" around Columbia Falls. Gusty winds accompanied the snow, with speeds reaching 68 mph at Deep Creek and 59 mph at Two Medicine.

Kalispell measured 29.2-inches of snow during February, their 4th highest of record and highest amount since 1936. Cut Bank received 12.4-inches of snow, their 6th highest February amount and highest amount since 2011. They received 0.82" of precipitation, their 4th highest of record and highest February amount since 1958. Missoula had their 5th wettest February and wettest since 2014. Mullan Pass saw their wettest February of record with 10.46". This exceeded their old record of 9.19" set in 1982. West Yellowstone recorded their wettest February with 4.15", exceeding the previous record set in 1936.

Snowstorm of Feb 4-7, 2017 and its aftermath

Several feet of snow fell over northwestern Montana as ample moisture flowing in from the west combined with a weather disturbance and upslope flow. As many as six feet of snow was reported. Many locations reported snowfall totals last seen for at least 17 years ago, in early June 2002. In June 2002, three to four feet of snow fell over the lower elevations of the Rocky Mountain Front and more than four feet fell over the higher elevations. Occasional blizzard conditions were also reported west of the Continental Divide.

Concerns turned to blizzard conditions as winds were expected to increase over the eastern slopes, after the snowfall. Although winds did gust over 70 mph in some locations on the 9th, the snow had crusted from warmer temperatures and little blowing or drifting occurred.

Concerns then turned to the potential for flooding. Temperature soared into the 50s and lower 60s. As temperatures generally fell below freezing a night, nature handled the melt very well and little changes were noted on area rivers and streams.

Snow Amount/Water Equiv	Location	Time Period
64" / E5.00"	St Mary	4-day Feb 3-7, 2017
63" / 5.20"	Many Glacier SNOTEL	4-day Feb 3-7, 2017
62.5"	East Glacier Park COOP	4-day Feb 3-7, 2017
60"	Babb (preliminary)	4-day Feb 3-7, 2017
52"	Marias Pass	4-day Feb 3-7, 2017
46" / 4.30"	Pike Creek SNOTEL	4-day Feb 3-7, 2017
46"	Polebridge	4-day Feb 3-7, 2017
41" / 4.00"	Badger Pass SNOTEL	4-day Feb 3-7, 2017
41" / 3.10"	Waldron SNOTEL	4-day Feb 3-7, 2017
38" / 4.30"	Mount Lockhart SNOTEL	4-day Feb 3-7, 2017
36"	Browning (preliminary)	4-day Feb 3-7, 2017

St Mary reported 64-inches of snow over the 4-day period ending Feb 7. This exceeds their previous 4-day extreme of 43-inches set in November 1990. Records began in 1981.

Babb had a preliminary total of 60-inches over a 4-day period. There were reports of even higher amounts west of Babb, towards Many Glacier. Snowfall records from Babb (1948-1994) show that the most reported over a 4-day period was 24-inches in 1954.

East Glacier reported 26-inches during the 24-hour period ending 8 am Feb 6. Two dates in two earlier years exceeded this amount. On Nov 17, 1978 29-inches fell, and on Oct 29, 1951 28-inches fell. For the most recent storm, over a two day period ending on Feb 6, 39.5-inches fell. This is the second highest two-day total recorded at East Glacier. Their highest two-day amount of 42-inches was on Feb 16-17, 1986. Over a 4-day period in Feb 1986, 55-inches fell, while a 3-day snowfall totaled 52-inches. This year, over a 3-day period, 49.5-inches were measured by the cooperative observer, while over a 4-day period they collected 62.5-inches. Records began in 1949.

The SNOTEL station at Many Glacier reported 63-inches over a 4-day period. Over a 3-day period 55 inches fell. Both of these far exceeded the previous 3-day record of 34-inches over a 3-day period and 36-inches over a 4-day period that occurred in Nov 2010. Twenty-five inches of snow fell in a 24-hour period ending at 9 am Feb 6, 2017. This exceeds the previous 24-hour record of

18.9-inches on Jan 11, 1969. The water-equivalent of the snow for the recent storm was 5.2-inches. While a large amount, there have been several other 4-day totals in the historical record that have exceeded 6-inches. Many Glacier also recorded 9.60-inches of precipitation for February, a new all-time record. Records began in 1967.

Pike Creek SNOTEL, near Marias Pass, reported 46-inches of snow (water equivalent of 4.3-inches) over the 4-day period ending Feb 7. Again, while high, there have been several other 4-day totals in the historical record exceeding this amount. Nearby Summit holds the snowfall records for Montana for a 4-, 5- and 6-day period. These values are 66-inches, 75-inches and 77-inches, respectively, and all set in January 1972. Pike Creek's records began in 1988, while Summit's began in 1948.

Browning reported a preliminary amount of 36-inches of snow. The records show that 36-inches also fell over a 3-day period in September 1908. Browning's records are from 1894-1996.

Badger Pass SNOTEL, Dupuyer Creek SNOTEL, and Pike Creek SNOTEL all reported larger multi-day snowfall amounts in June 2002. These amounts were 42-inches, 30-inches, and 47-inches, respectively.

Precipitation/convection

Severe convective weather occurred on 1 day in February, above the normal of none.

Water-year-to-date summary

The composite statewide average temperature for the water year through February was 27.5°F (0.4°F below normal). This was the 61st coolest of record and the coolest since 2014.

The composite precipitation is 6.35", or 2.21" above normal. September, October and February were particularly wet. This is the 2nd wettest such period of record, and the wettest since 1881. Composite snowfall is 53.1". This is 13.6" above normal and the heaviest period snowfall since 2014. This is the 14th highest period snowfall amount.

Helena has had 48.6" of snow, their highest since 1993 and 29th highest of record. Cut Bank has measured 49.7" of snow, their 3rd highest of record and most since 1959.

For winds, the average state wind speed was 8.9-mph, 0.2-mph above normal. This was the 22nd calmest year of record.

Winter (Dec-Feb) summary

For the entire winter period, Helena recorded 66 consecutive days with a snow depth of 4 inches or more. This is the longest stretch on record, exceeding the old record of 64-inches set in 1968-69.

Since December 1st...47.3 inches of snow has fallen at the Helena Regional Airport. This is the 14th snowiest winter period of record, and the highest since 1977-78. Kalispell measured 75.5" for this period, their 7th highest of record and highest since 2009-10. Cut Bank had 23.4" of snow, their 4th highest of record and highest since 2009-10. West Yellowstone has recorded 9.74" of precipitation this winter, their 7th highest of record and wettest since 2010-11.

For the state, the average snowfall was 48.1", or 19.2" above normal. This is the 3rd highest of record and the highest since 2010-11. Holter Dam has received 53.9" of snow this winter season, their second snowiest of record and snowiest since 1940-41.

The average precipitation for the winter season was 2.93", which was 0.75" above normal. This is the 26th wettest and the wettest since 2010-11. Cut Bank received 2.42" of precipitation for this period, which is their 5th wettest such period of record and their wettest since 1989-90.

For the state, the average temperature for the winter season was 17.6°, which was 4.1° below normal. This is the 32nd coolest of record and the coolest since 2010-11.

The statewide wind average for the winter season was 9.2 mph, which was 0.2 mph above normal. This is the 29th calmest of record, but windiest since 2013-14.

February summary information:

High Temperature	73°F at Dry Blood Creek (Petroleum) and Fort Belknap (Blaine) (15 th)	Greatest Precip	7.63" at Libby 28SSW
Low Temperature	-38°F at Elk Park (3 rd)		14.2" at Hoodoo Basin (Mineral)
Warmest Ave Temp	32.8°F at Fourmile RAWS (Park)	Peak Wind Gust	96 mph at Deep Creek RAWS (10 th)
Coollest Ave Temp	17.9°F at Point Six (Missoula)		77 mph at Two Medicine and Sapphire Village (16 th)
Range of Temp departures	4.4°F at Ekalaka to -5.0° at Polson	Highest Ave Wind	17.8 mph at Livingston 18.7 mph at Norris Hill MDT (Madison)
21 city mean monthly Temperature/Normal	25.2/24.2F normal. 45 th warmest of record (since 1880). 67 th percentile.	20 city mean monthly wind speed/Normal	8.9 mph/8.7 mph; 22 nd calmest of record (since 1936). 41 st percentile.
22 city mean monthly precipitation/Normal	1.34"/0.58" – 231% of normal. 4 th wettest of record (since 1880). 97 th percentile.		

**Historical Rank of Precipitation (inches)
for the Current Month and Water Year to Date**

Location	Feb	% of Norm	Rank	Pcntl	Oct 1 – Feb 28	% of norm	Rank	Pcntl	Years
Baker	0.15	47%			1.21	49%			19
Billings	0.83	143%	18	14	7.02	172%	5	3	116
Belgrade	0.27	60%	57	70	3.90	117%	27	33	80
Butte	0.48	112%	60	48	4.01	144%	26	21	122
Cut Bank	0.82	390%	4	3	3.75	266%	6	5	110
Dillon	0.15	63%	43	55	3.00	163%	5	5	77
Glasgow	0.55	212%	17	13	4.55	209%	6	4	118
Great Falls	0.57	121%	50	39	4.35	146%	27	21	125
Havre	0.69	246%	27	19	5.37	266%	5	3	137
Helena	0.68	227%	32	22	4.28	192%	23	16	138
Jordan	0.58	232%			3.35	163%			19
Kalispell	2.78	287%	2	1	10.98	174%	3	2	123
Lewistown	0.68	155%	49	40	5.43	155%	20	16	121
Livingston	0.91	182%	13	10	6.51	194%	4	3	114
Miles City	0.39	170%	55	39	1.55	72%	114	81	140
Missoula	2.27	324%	5	3	7.93	175%	10	7	137
Mullan Pass	10.46	333%	1	1	28.82	136%	14	17	76
Wolf Point	0.23	110%			2.21	109%			19
Glendive	0.50	156%	36	28	2.76	107%	45	37	119
Sidney	0.42	127%	21	26	3.01	103%	24	30	77
BZN MSU	0.92	118%	42	30	7.55	139%	10	7	138
Wyellow	4.15	263%	1	1	18.11	187%	2	1	103

Rankings and Percentiles are 1=driest, higher numbers=wetter.

For an automated version of this chart, updated daily, go to

<http://www.wrh.noaa.gov/tfx/dx.php?wfo=tfx&type=&loc=products&fx=PCPNTOTALS>

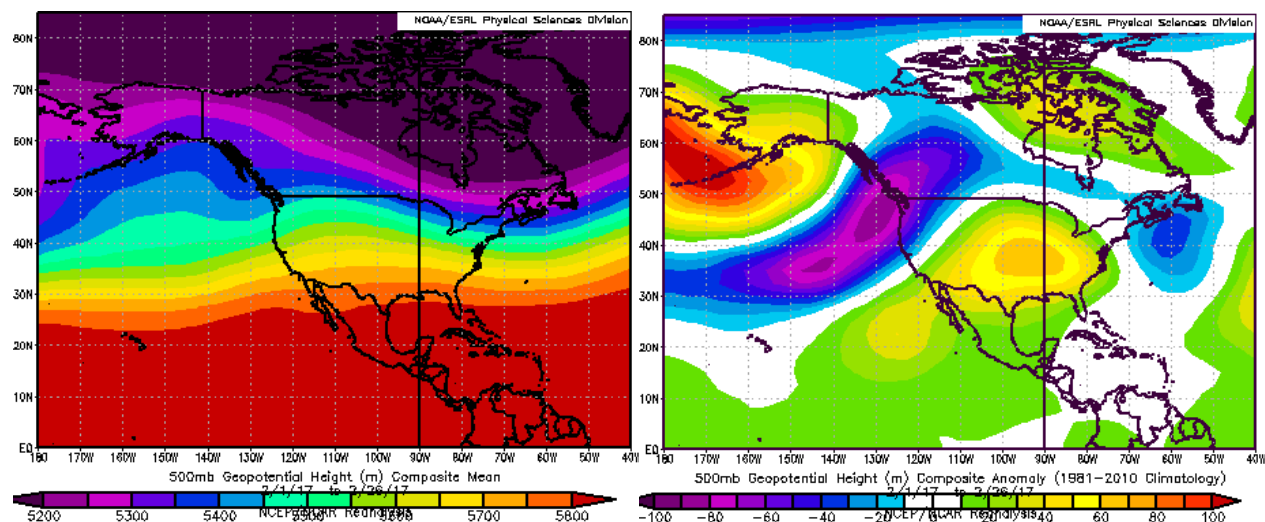


Figure 1. Mean flow at 500 millibars (~18,000 ft) for this month (upper left) and departure from normal (upper right).

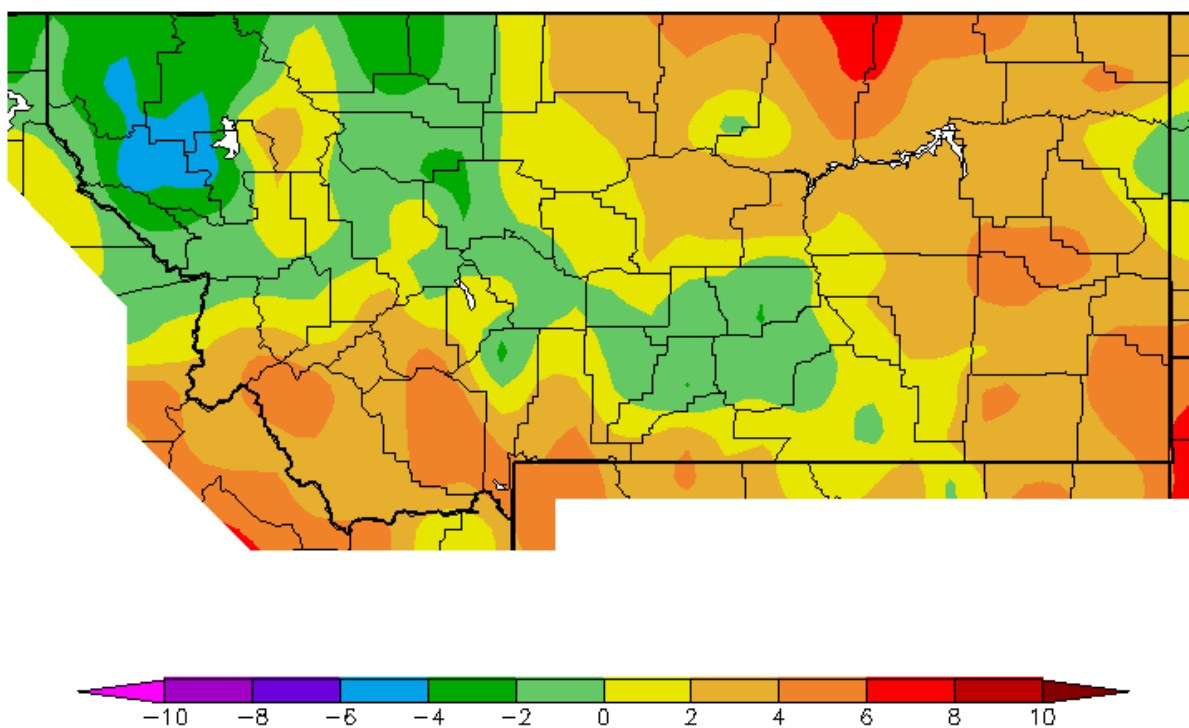


Figure 3. February 2017 temperature departures from normal (°F) (Western Region Climate Center).

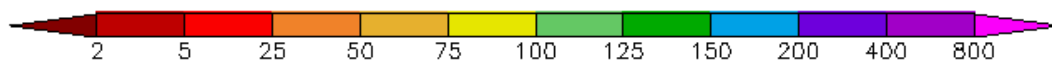
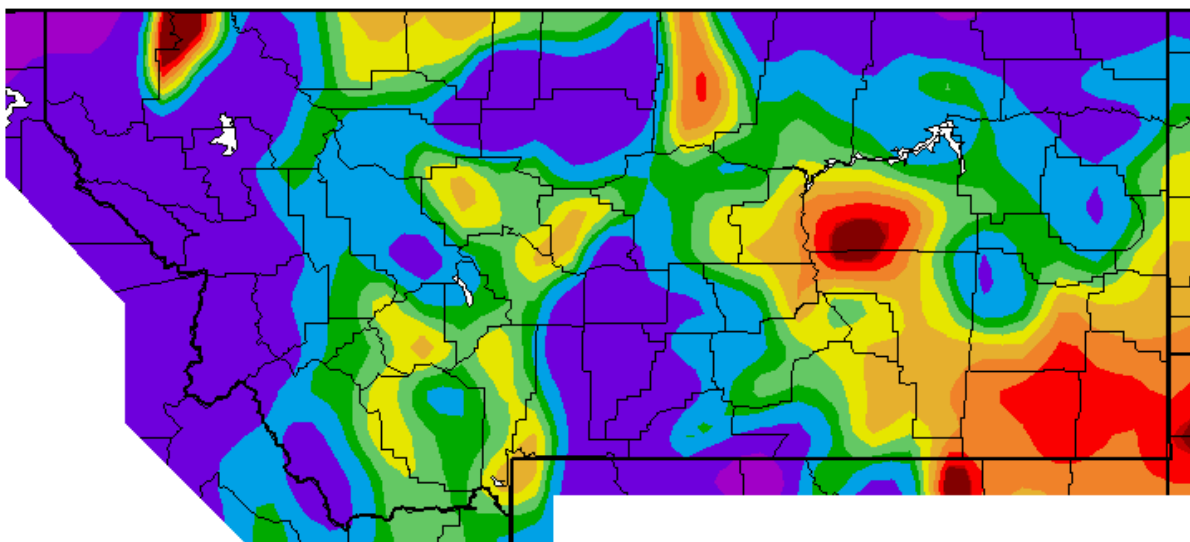


Figure 4. February 2017 precipitation departures from normal (percent) (Western Region Climate Center).

For a state map of % of normal water year precipitation (updated around the 7th of each month), go to:

<http://www.wrh.noaa.gov/tfx/climate/monthlysum/climatesum.php?wfo=tx>

For the latest information on mountain snowpack from the NRCS, go to: <http://www3.wcc.nrcs.usda.gov/snow/index.html>

For the latest U.S. Drought Monitor, issued weekly by the National Drought Mitigation Center, USDA and NOAA, go to:

<http://droughtmonitor.unl.edu/>

These data are preliminary and have not undergone final QC by NEIC. Therefore, these data are subject to revision. Final and certified climate data can be access at the National Environmental Information Center (NEIC) <http://www.ncdc.noaa.gov>. Many more links are on the Drought Information Page of the NWS Great Falls web site at <http://www.wrh.noaa.gov/tfx/main/drought.php?wfo=tx>. The climatological record for normals is 1981-2010. The ranking period for temperature, precipitation and snowfall is since 1880. The ranking period for wind speeds is since 1936. The ranking period for soil moisture is since 1995.